DRAFT
Air Quality Monitoring Work Plan
for the Yerington Mine Site

December 22, 2004

Prepared for:

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SECTION 1.0
INTRODUCTION

Air quality monitoring will be conducted by Atlantic Richfield Company at the Yerington Mine to support an evaluation of the potential risk to human health and the environment that may result from fugitive dust generated by mine surface units and process areas. Fugitive dust emissions from the mine will be evaluated for one year using strategically-placed air quality monitoring stations at the perimeter of the site. For particulate matter, monitoring results will be evaluated in the context of National Ambient Air Quality Standards (NAAQS). The following Work Plan was developed in concert with EPA's contractor (Tetra Tech / EMI) and describes the monitoring locations and equipment, sampling specifications, analytical methods, quality assurance program, data management, reporting, and schedule.

SECTION 2.0
MONITORING LOCATIONS AND EQUIPMENT

Air quality monitoring will be conducted at six locations near the perimeter of the site as shown on Figure 1. All locations will monitor particulate matter with a diameter of 10 microns or less (PM_{10}) with a high volume air sampler and total suspended particulates (TSP) with a separate high volume air sampler. Location AM-1 will have a secondary PM_{10} high volume air sampler co-located with the primary sampler for duplicate analysis. An existing meteorological (met) station is proximate to location AM-6. A summary of the equipment and approximate coordinates for each monitoring location are provided in Table 1.

Table 1 Monitoring Locations and Equipment

Location	Equipment	Latitude	Longitude
AM-1	PM_{10} high volume samplers (primary and co-located duplicate) and TSP high volume sampler	38° 59.678	119° 12.737
AM-2	PM_{10} high volume sample and TSP high volume sampler	39° 00.535	119° 13.197
AM-3	PM_{10} and TSP high volume samplers	38° 59.885	119° 11.581
AM-4	PM_{10} and TSP high volume samplers	39° 00.722	119° 11.007
AM-5	PM_{10} and TSP high volume samplers	39° 01.126	119° 11.958
AM-6	PM_{10} and TSP high volume samplers	39° 01.476	119° 12.204
--	Meteorological station	39° 01.477	119° 12.267

Coordinates are approximate

Construction of the six monitoring locations would begin in December 2004. Each monitoring location will be serviced with permanent electrical supply and the equipment will be secured to a 3 foot by 3 foot by 3 inch concrete pad. The monitoring locations and placement of the equipment will comply with criteria specified in 40 CFR 58 Appendix E Section 8 including appropriate vertical placement and spacing from roads and obstructions. For security purposes, chain link fencing would be constructed around each air quality sampler pending EPA approval.

The met station was installed at the Yerington Mine between May 1 and 6, 2002 and has been operational since May 7, 2002. The station is located adjacent to PW06 (pumpback well number 6) at the northern margin of the mine site.

2.1 High Volume Air Sampling Equipment

Tisch Environmental, Inc. manufactures the high volume air sampling equipment to be used in this program and has received approval from the EPA under Federal Reference Method Number RFPS-0202-141. The PM_{10} and TSP high volume air sampler specifications are summarized in Table 2 and described in the following sections.

Table 2. High Volume Air Sampler Specifications

Type	PM_{10}	TSP
Manufacturer	Tisch Environmental, Inc.	Tisch Environmental, Inc.
Model	TE-6070D	TE-5170-D
Construction	anodized aluminum	anodized aluminum
Inlet	size selective, vertically symmetric	n/a
Flow Rate	36 to 44 ft^3/min	39 to 60 ft^3/min
Flow Control	mass flow controlled w/ probe	mass flow controlled w/ probe
Motor Blower	2-stage vacuum, 0.6 hp	2-stage vacuum, 0.6 hp
Flow Indicator	continuous flow/pressure recorder	continuous flow/pressure recorder
Timer	digital timer/elapsed time indicator	digital timer/elapsed time indicator
Electrical supply	110 V, 60 Hz, 5 A (12 A start)	110 V, 60 Hz, 6 A (12 A start)

2.1.2 PM_{10} High Volume Sampler

The TE-6070D is a mass flow controlled high volume air sampler for measurement of PM_{10}. The system components are housed in an anodized aluminum shelter that supports a size selective, vertically symmetric PM_{10} inlet. A blower motor assembly draws air through the 8 inch by 10 inch quartz fiber filter which is held in place by a filter paper cartridge. A combination mass flow controller with air flow probe, digital timer, and digital elapsed time indicator provides a constant flow rate and programmable operation. A continuous flow/pressure recorder verifies the sample duration and ensures the target volume is achieved. Photographs of the TE-6070D and system components are provided in Appendix A.

2.2.2 TSP High Volume Sampler

The TE-5170D is a mass flow controlled high volume air sampler for measurement of TSP. The system components are housed in an anodized aluminum shelter with a gabled roof. A blower motor assembly draws air through the 8 inch by 10 inch quartz fiber filter which is held in place by a filter paper cartridge. A combination mass flow controller with air flow probe, digital timer, and digital elapsed time indicator provides a constant flow rate and programmable operation. A continuous flow/pressure recorder verifies the sample duration and ensures the target volume is achieved. A photograph of the TE-5170D is provided in Appendix B. The system components in the TE-5170D are nearly identical to those in the TE-6070D.

2.2 Meteorological Station

The met station is equipped with instruments for recording air temperature, relative humidity, precipitation, solar radiation, wind speed, and wind direction. The data logger attached to the instruments is currently programmed to sample every 2 seconds and write data every 10 minutes and at 24 hours. Depending upon the desired data output, the data output program can be modified. The instruments attached to the station include:

- One CR10X control system and data logger
- One 12 V charger and regulator
- One 18 V 1.2 A wall transformer with 6 foot cord
- One 12AH sealed rechargeable battery with mounting
- One 16” by 18” weatherproof enclosure with one conduit
- One 10 foot tripod with grounding kit
- One RM Young 05305 Wind Monitor-AQ for recording wind speed and direction. This model is specifically designed for air quality measurements and according to Campbell Scientific, meets or exceeds requirements published by the EPA. The instrument is rated for wind speeds between 0 to 90 miles/hour and single gusts of 100 miles/hour.
- 12-feet of WIR CA 24AWG 3TWST PR santoprene jacket
- One aluminum crossarm sensor mount
- One Vaisala temperature/RH probe
- 6-feet of WIR CA 24AWG 3TWST PR santoprene jacket
- One RM Young 12 plate gill solar radiation shield for temperature and RH probe
- One Kipp & Zonen silicon pyranometer. This instrument is typically used in solar radiation applications such as plant growth and evapotranspiration investigations. It is mounted on the south crossarm and is unobstructed.
- 12-feet of WIR CA 22AWG 1TWST PR santoprene jacket
- One Kipp & Zonen base and leveling fixture for pyranometer
- One pyranometer crossarm stand
- One Texas Electronics 8” rain gage 0.01 tip
- 35 feet of WIR CA 22AWG 1TWST PR santoprene jacket
- One tipping bucket CS705 snowfall adapter with antifreeze
- One RS-232 Interface and serial cable for downloading data

- One copy of PC208W data logger programming software

Primary power to charge the 12 V battery is supplied from the line that supplies pumpback well PW06. The met station equipment is mounted to a CM10 tripod with a nominal height of 10 feet. The base diameter of the tripod is about 10 feet and does not obstruct access to well PW06. The leg configuration of the tripod is adjustable for uneven terrain and has been adequately leveled according to the manufacture specifications. The unit is designed to withstand a sustained wind of 70 miles per hour (mph) and gusts of 100 mph. Three 2-foot rebar stakes hold the station in place and one of the stakes is cemented into the ground. Photographs of the met station are provided in Appendix C.

SECTION 3.0
SAMPLING SPECIFICATIONS

Sampling will be conducted in accordance with 40 CFR, Chapter 1, Appendix J to Part 50, *Reference Method for the Determination of Particulate Matter as PM-10 in the Atmosphere*. The monitoring will involve collecting an integrated (i.e., continuous) 24-hour air sample from midnight to midnight on the target day. Targeted values for sample duration, flow rate, and volume for both PM_{10} and TSP samples are provided in Table 3. The table also includes parameter variances that are allowed by the PM_{10} and TSP methods.

Table 3. PM_{10} and TSP Sample Specifications

Parameter		PM_{10}	TSP
Sample Duration	Target	1,440 min	1,440 min
	Allowable variance	1,380 to 1,500 min	1,380 to 1,500 min
Sample Flow Rate	Target	40 ft^3/min (1.13 m^3/min)	59 ft^3/min (1.67 m^3/min)
	Allowable variance	36 to 44 ft^3/min (1.02 to 1.24 m^3/min)	39 to 60 ft^3/min (1.10 to 1.70 m^3/min)
Sample Volume	Target	57,600 ft^3 (1,630 m^3)	84,750 ft^3 (2,400 m^3)

Although the monitoring equipment has a digital timer and mass flow controller, actual sample duration and flow rate may differ from targeted values. The actual detection limits achieved are dependent upon the instrument detection limit and sample volume (e.g., sample volumes less than targeted values result in higher than targeted detection limits).

SECTION 4.0
PROPOSED ANALYTICAL METHODS

Proposed analytical methods and associated information including target detection limit, sample hold time, and sample media (i.e., filters) are summarized in Table 4 for parameters that may be analyzed under this Work Plan. The actual parameters and analytical methods to be used in the air quality monitoring program are being negotiated, and will be finalized in a separate letter addendum.

Table 4. Proposed Analytical Methods

Analysis	Method	Targeted Detection Limit	Sample Hold Time	Sample Media
PM_{10}	EPA IO-2.1	+/- 5 µg/m^3	6 months	8” x 10” quartz fiber filter
Thorium (228, 230, 232)	HASL-300	4.2 E-04 pCi/m^3	6 months	8” x 10” quartz fiber filter
Radium 226	EPA 903.1M	4.2 E-04 pCi/m^3	6 months	
Radium 228(b)	EPA 904.0M	6.5 E-03 pCi/m^3	6 months	
Gross Alpha	HASL-300	8.3 E-03 pCi/m^3	6 months	
Gross Beta	HASL-300	2.5 E-04 pCi/m^3	6 months	
Uranium (234, 235, 238)	HASL-300	4.2 E-04 pCi/m^3	6 months	
Arsenic	SW846-6020/6010B	0.07 µg/m^3	6 months	
Barium	SW846-6020/6010B	0.28 µg/m^3	6 months	
Cadmium	SW846-6020/6010B	0.07 µg/m^3	6 months	
Chromium	SW846-6020/6010B	0.07 µg/m^3	6 months	
Lead	SW846-6020/6010B	0.07 µg/m^3	6 months	
Mercury	SW846-7471A	0.0014 µg/m^3	28 days	
Selenium	SW846-6020/6010B	0.35 µg/m^3	6 months	
Silver	SW846-6020/6010B	0.07 µg/m^3	6 months	

HASL = Methods from *Environmental Measurements Laboratory (EML) Procedures Manual*, 27th Edition, November 1990

EPA = Methods from *EPA-600, Prescribed Procedures for Measurement for Radioactivity in Drinking Water*, August 1990

SW = *USEPA Test Methods for Evaluating Solid Wastes, SW-846*, 3rd Edition

SECTION 5.0
QUALITY ASSURANCE PLAN

The quality assurance program is based on requirements specified in the *Quality Assurance Project Plan, Yerington Mine Site* (QAPP) dated September 19, 2003. The program incorporates the following items: standard operating procedures (SOPs), equipment calibration and maintenance, independent audit, field quality control (QC) samples, certified laboratory, laboratory QC samples, data validation, and corrective action.

5.1 Standard Operating Procedures

Sampling, calibration, and maintenance will be conducted in accordance with SOPs provided in the QAPP and by the equipment manufacturer. The SOP for operation of the PM_{10} high volume air sampler is provided in Appendix D. This SOP includes detailed instructions on sampler operation, digital timer operation, and total sample volume calculations. The SOP for operation of the TSP high volume air sampler is provided in Appendix E. This SOP includes detailed instructions on sampler operation. Instructions for digital timer operation and total sample volume calculations are the same as for both the PM_{10} and TSP air sampling equipment. SOPs for equipment calibration and maintenance are discussed in the following sections.

5.2 Equipment Calibration

Equipment calibration for the high volume air samplers and met station will be performed according to the manufacturer as described below. This section also describes the calibration report that will be included in the quarterly and annual reports (refer to Section 7.0).

5.2.1 High Volume Air Samplers

Calibration of the PM_{10} and TSP air sampling equipment will be performed by Brown and Caldwell. The manufacturer recommends the equipment be calibrated according to the following schedule:

- Upon installation;
- After any motor maintenance;
- Once every quarter (3 months); and
- After 360 sampling hours.

The same calibration SOP is used for both the PM_{10} and TSP high volume air samplers and is provided in Appendix F. The air sampling equipment will be calibrated with the Tisch Environmental, Inc. variable resistance calibration kit. The kit includes a variable orifice, NIST traceable calibration certificate, adapter plate, slack tube manometer, and tubing. In addition to following the calibration procedures specified in the SOPs, the following calibration criteria must be met:

- Minimum of five calibration points;
- Three calibration points within the allowable variance range (e.g., for PM_{10}, three points must be within 36 to 44 ft^3/min); and
- Correlation coefficient greater than 0.990.

5.2.2 Meteorological Station

Calibration of the met station will be performed by a qualified third party at the start of the program and on a semi-annual basis thereafter.

5.2.3 Calibration Report

The calibration of the high volume air samplers and met station will be included in the quarterly and annual reports. The information listed below will be provided in the calibration report.

- Calibration summary
- Calibration methods
  - PM_{10} high volume samplers
  - TSP high volume samplers
  - Met station
- Calibration equipment
- Calibration results and comments

5.3 Equipment Maintenance

Maintenance for the PM_{10} and TSP air sampling equipment and met station will be performed by Brown and Caldwell according to the manufacturer. Equipment maintenance for the PM_{10} and TSP high volume air samplers is provided in Appendix G and consists of routine maintenance, motor brush replacement, and troubleshooting/corrective action. The manufacturer recommends checking or replacing motor brushes every 300 to 500 hours of operation. Meteorological station equipment is provided in Appendix H.

5.4 Independent Audit

The EPA may choose to conduct an independent audit of the high volume air samplers and meteorological station to verify calibration and operation.

5.5 Field QC Samples

Field QC samples consist of 10% duplicates, 5% trip blanks, and 5% equipment blanks. The duplicate samples will be collected by co-locating a second PM_{10} sampler at location AM-1. Trip and equipment blanks will be initiated by requiring the laboratory to supply all media (i.e., filters). Trip blanks will be collected by simply returning a filter without taking it out of the protective sleeve. Trip blanks will accompany samples during shipment to and from the site. Equipment blanks will be collected by placing the filter in the sample holder, but not operating the sampler. The filter will then be replaced into the protective sleeve and returned to the laboratory with the samples for analysis. Trip and equipment blanks will be submitted blind to the laboratory.

A sampling and analysis plan (SAP) that lists primary and field QC samples is provided in Appendix I. The SAP lists the proposed sample dates, general type of analysis, primary samples, and field QC samples. There are a total of 61 sampling events and the sample dates are based on the NAAQS monitoring schedule for PM_{10} (refer to Section 8.0). Twelve primary samples are generated during each sampling event resulting in a total of 732 primary samples. The table identifies the locations and events for field QC samples that are in addition to the primary samples. Sixty-one duplicate PM_{10} samples will be collected at AM-1 as described above. Thirty seven trip blanks and 37 equipment blanks will be collected at locations and during events that were assigned randomly using Minitab statistical software.

5.6 Certified Laboratory

The analyses will be performed by Severn Trent Laboratories (STL) at their Richland, Washington and Sacramento, California locations. STL has current certifications from the Nevada Division of Environmental Protection (NDEP) and the National Environmental Laboratory Accreditation Program (NELAP) provided in Appendix J.

5.7 Laboratory Quality Control Samples

Laboratory QC samples consist of method blanks, laboratory control sample (LCS) or blank spike, and sample duplicates for applicable methods.

5.8 Data Validation

The laboratory will provide a standard data package for all samples and a comprehensive validation package for 10% of all samples. Brown and Caldwell will conduct data verification for 100% of all samples using the standard data package. Data verification will be performed on the air monitoring data according to the criteria provided in Appendix K. Data verification will be performed on the meteorological data according to the criteria provided in Appendix L. An independent third party will conduct data validation on 10% of all samples using the comprehensive validation package.

5.9 Corrective Action

In the event of error or omission during the execution of this air quality monitoring program, a corrective action procedure will be implemented. The procedure begins with prompt notification to the Project Manager, an investigation into the cause and effect of the incident, implementation of the corrective action, and submittal of a corrective action letter to the lead agency. The letter will describe the incident, investigation results, and corrective action taken.

SECTION 6.0
DATA MANAGEMENT

Data management components consist of data acquisition, data entry, and the database. Data acquisition will consist of a field data sheet to record high volume air sampler parameters, electronic download of meteorological data, and laboratory submission of electronic data deliverables (EDD) for analytical results. Information from the field data sheet will be hand entered into the database. Downloads of meteorological data occur once every three weeks. Meteorological data downloads and EDDs will be loaded into the database with automatic data loading programs. The data will be stored in a Microsoft SQL Server relational database and retrieved and queried with a Microsoft Access graphical user interface.

SECTION 7.0
REPORTING

Reporting will consist of three quarterly reports, one annual report, and electronic data submittal as described below.

<u>Quarterly Report</u>

The quarterly report will be a brief letter report that summarizes the monitoring activities during the quarter, data collected, results of calibration, and maintenance performed. Tables will summarize the analytical results by monitoring event and average meteorological conditions by month. Appendices will provide field data sheets, the calibration report, analytical laboratory reports, and data verification results. The quarterly report will be submitted final to the lead agency.

<u>Annual Report</u>

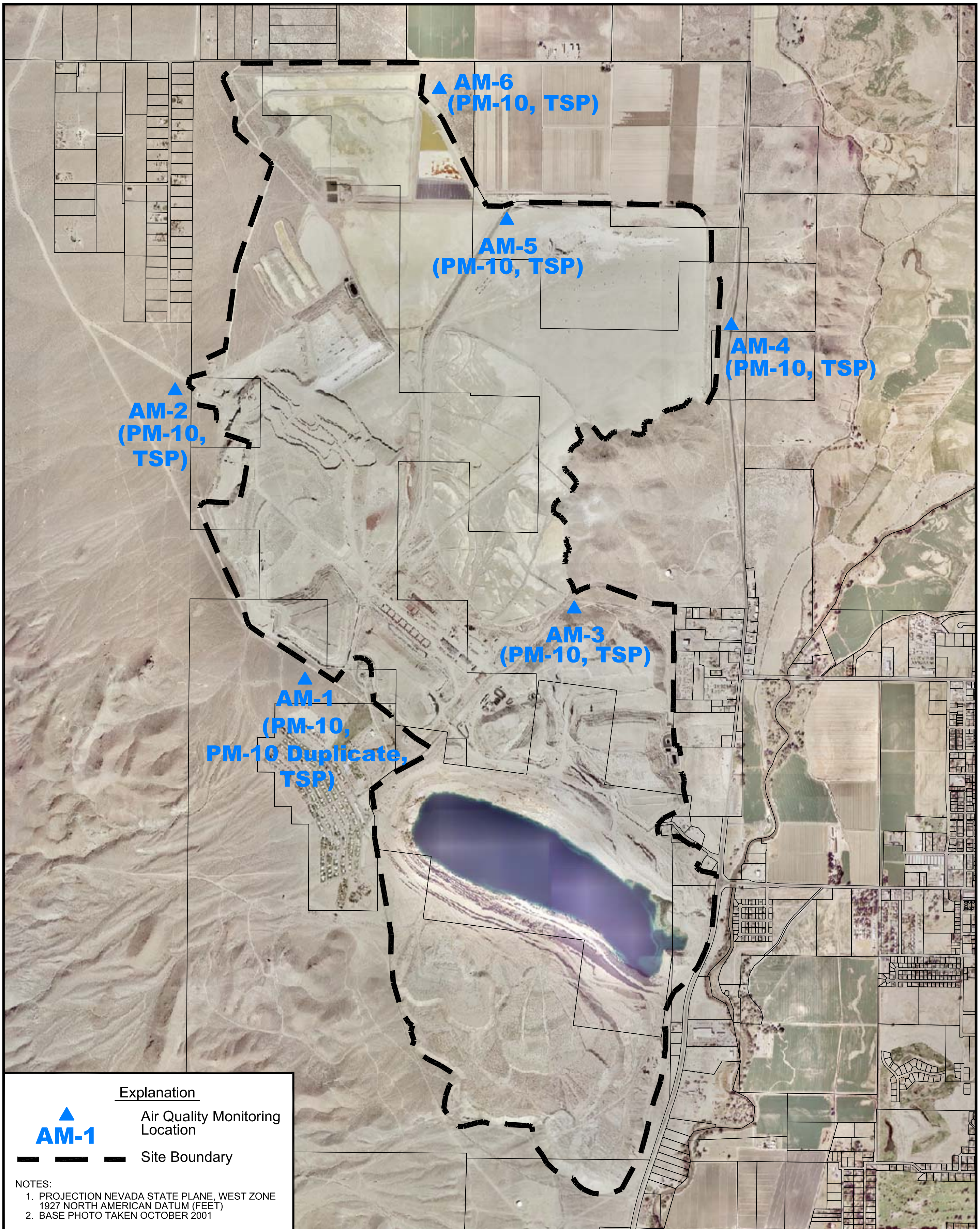
The annual report will present the information provided in a quarterly report, summarize the activities of the entire monitoring period, present an interpretation of the results, and provide conclusions and recommendations. Tables and appendices will be similar to those included in the quarterly report. The annual report will be submitted draft final to the lead agency for comment. Upon receiving and incorporating comments from the lead agency, a final report will be delivered.

<u>Electronic Data Submittal</u>

Electronic copies of the monitoring data in Microsoft Excel format will be provided to the lead agency with the quarterly and annual reports.

SECTION 8.0
SCHEDULE

The schedule for air quality monitoring would be conducted in accordance with the NAAQS monitoring schedule for PM_{10}. Monitoring would be conducted every sixth day commencing in the first quarter of 2005 and ending four quarters later for a total of 61 events. The monitoring start date is contingent upon agency approval, weather conditions and permanent electrical service installation. The turn around time for analytical results would be 14 calendar days for PM_{10} and 28 calendar days for all other analyses. Quarterly monitoring reports would be delivered to the lead agency by the 21st day of the second month following the completion of the quarter. The draft final annual report would be delivered to the lead agency by the 21st day of the second month following the completion of sampling. The final annual report would be delivered 30 days following receipt of lead agency comments on the draft final.



DATE: Dec. 2004	PROJECT NUMBER: 21243	SCALE: 0 1250 2500 SCALE IN FEET	Atlantic Richfield Company	Figure 1
BROWN AND CALDWELL Carson City, Nevada				Air Quality Monitoring Locations

Carson City Cad: P:\ARCO\21243\Air Quality\CAD\drawings\Oct 2004\F21243001.dwg (1=1) 10/26/2004 17:20:37 RJJ

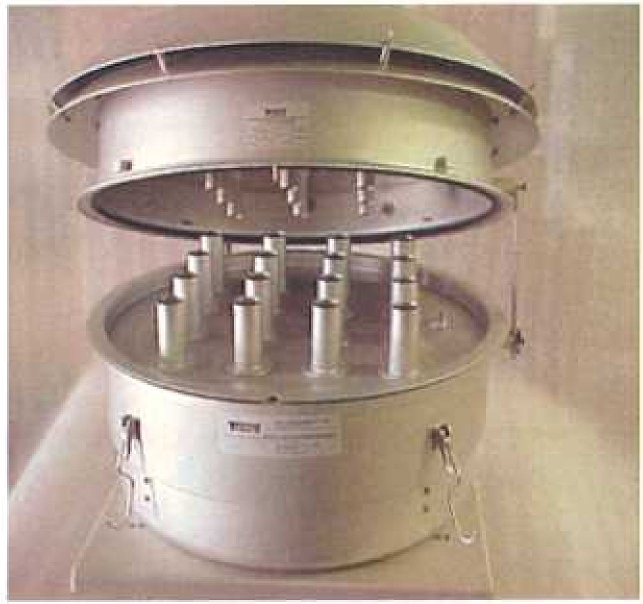
Appendix A.

Photographs of PM_{10} High Volume Air Sampler

Tisch Environmental, Inc. Model TE-6070D

TE-6001 Size Selective PM10 Inlet (cut point less than 10 micron) Precision Symmetrical Designed Inlet insures wind direction insensitivity. Large particles are impacted on a greased shim plate. Particles smaller than 10 microns are collected on the 8" x 10" Quartz Filter.

TE-6001 Closed

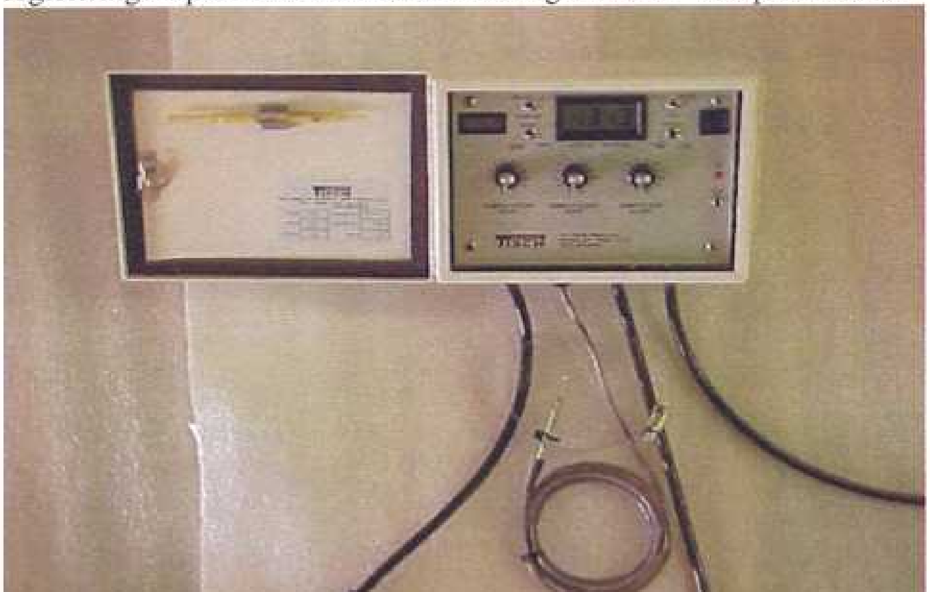


TE-6001 Open Position

TE-6001 Shown raised over shelter to expose filter cartridge

TE-3000 Filter Media Holder/Filter Paper Cartridge facilitates the changing of filters by keeping contamination off the clean filter and protects the particulate on the filter from being disturbed during transit. Shown in photo below on top of TE-6003.

TE-300-312 Combination Mass Flow Controller w/20 to 60 SCFM Air Flow Probe, Digital Timer and Digital Elapsed Time Indicator. Controls a constant Flow rate through 8" x 10" Filter Media (TE-QMA Micro Quartz Filter Media required for PM10) Also turns sampler on/off at precise times while registering elapsed time on a re-settable digital E.T.I. See photo below



TE-5028 Variable Resistance Calibration Kit. This model is recommended for all Tisch Environmental PM10 Systems. Included: Variable Orifice, NIST Traceable Calibration Certificate, Adapter Plate, Slack Tube Manometer, Tubing and Carrying Case.

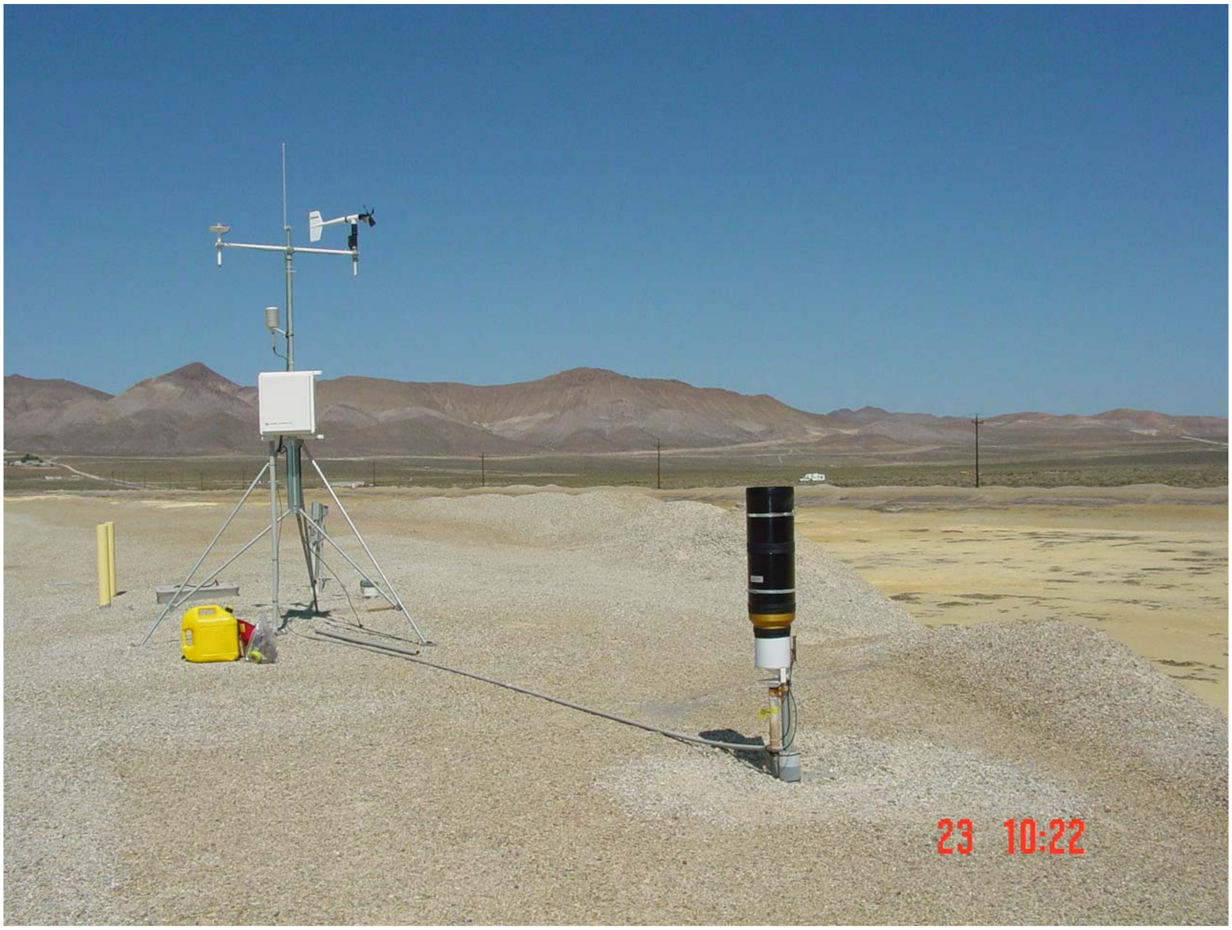
Appendix B.

Photograph of TSP High Volume Air Sampler

Tisch Environmental, Inc. Model TE-5170D

Appendix C.

Photographs of the Meteorological Station

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Appendix D.

SOP – Operation of PM_{10} High Volume Air Sampler

- Sampler Operation
- Digital Timer Operation
- Total Volume Calculations

SAMPLER OPERATION

TE-6070, TE-6070D

1. After performing calibration procedure, remove calibrator and top loading adapter. Install TE-3000 Cartridge and remove filter holder frame.

2. Carefully center a new filter, rougher side up, on the supporting screen. Properly align the filter on the screen so that when the frame is in position the gasket will form an airtight seal on the outer edges of the filter.

3. Secure the filter with the frame, brass bolts, and washers with sufficient pressure to avoid air leakage at the edges (make sure that the plastic washers are on top of the frame).

4. Wipe any dirt accumulation from around the filter holder with a clean cloth.

Size Selective Inlet Shim Plate Part number TE-6001-24

An anodized aluminum Shim Plate is supplied on top of the 1st stage plate of the SSI and can be seen by opening the body of the SSI. This collection Shim Plate needs to be heavily greased according to the following frequency and procedure.

Cleaning Frequency

Average TSP at Site	Number of Sampling Days	Interval Assuming Every 6th Day Sample
40 ug/m^3	50	10 months
75 ug/m^3	25	5 months
150 ug/m^3	13	3 months
200 ug/m^3	10	2 months

Cleaning of the Shim Plate is done after removal from the SSI.

- To remove the Shim Plate, unlatch the four SSI hooks located on the sides of the SSI body. Slowly tilt back the top inlet half exposing the 9 acceleration nozzles. Tilt the SSI top half until the SSI body support strut drops and locks into the second, fully open, notch and supports the top half of the inlet. Two Shim Plate Clips located on the right and left sides should be rotated 90° to release the fastening pressure on the shim. The Shim Plate should be handled by the edges and slowly lifted vertically to clear the height of the 16 vent tubes and pulled out forward toward the operator. A clean cloth is used to wipe the soiled grease from the Shim Plate. Acetone or any commercially available solvent can be used to clean the Shim Plate to its original state.
- Clean the interior surfaces of the SSI using a clean cloth.
- Place Shim Plate on a clean flat surface away from the rest of the SSI assembly and spray the

Shim Plate with a coating of Dow Corning Silicone #316. This grease is available from Tisch Environmental or from your local Dow Corning Distributor.

- Make sure the Shim Plate is clean, and apply a "generous" amount of the silicone spray after shaking the aerosol can. Spray holding the can 8 to 10 inches away. Spray is necessary in the areas which are below the acceleration nozzles. Allow 3 minutes for the solvent in the spray to evaporate leaving the final greased Shim Plate tacky, but not slippery. After drying, a cloudy film is visible, with a film thickness at least twice the diameter of the particles to be captured. Overspraying with the silicone will not hurt the performance of the SSI, so when in doubt, apply more silicone spray.
- Before reinserting the greased Shim Plate, wipe off all interior surfaces of the SSI and brush any loose dirt or insects off the Bug Screen located below the removable Shim Plate.
- Lift the greased Shim Plate by the edges and place it on the SSI 1st stage plate over top of the vent tubes with the greased side up in reverse order of the above removal procedure. Swing the two Shim Plate Clips over the edge of the greased Shim Plate to hold it securely in place.
- Close the SSI making sure of a good snug fit. Latch the 4 hooks firmly in place.

5. Close PM10 Inlet carefully and secure with all hooks and catches.

6. Make sure all cords are plugged into their appropriate receptacles and on all VFC systems make sure the clear tubing between the filter holder pressure tap and the bulkhead fitting is connected (be careful not to pinch tubing when closing door).

7. Prepare the Timer: See Timer Instructions

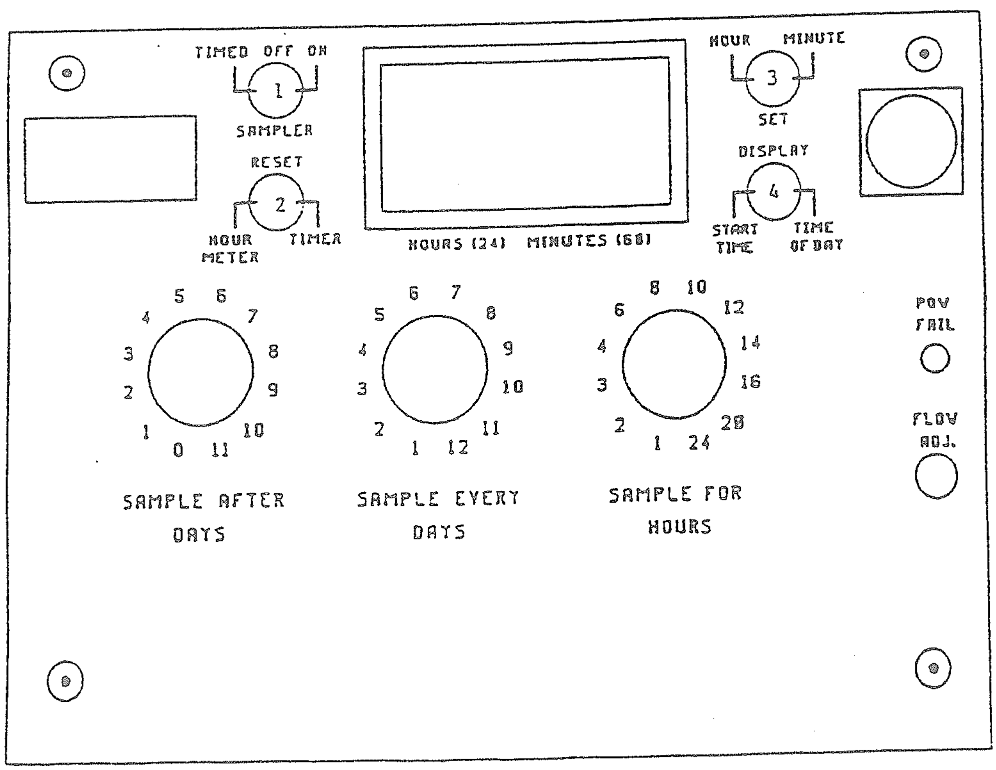
8. At the end of the sampling period, remove the frame to expose the filter. Carefully remove the exposed filter from the supporting screen by holding it gently at the ends (not at the corners). Fold the filter lengthwise so that sample touches sample.

9. It is always a good idea to contact the lab you are dealing with to see how they may suggest you collect the filter and any other information that they may require.

Operating Instructions for TE-302 Digital Timer

To set up the digital timer:

- Start with the Sampler Switch (Timed – Off – On) Switch #1, in the Off position.
- If you need to test or adjust the blower motor turn the Sampler switch to On. When done with adjusting, turn it back to Off.
- Place the rotary switches in the desired positions.
- If today is Friday and you want the first sample time on Sunday, turn the "Sample After Days" switch to position 2.
- If you want to run the sampler every Sunday after that, turn the "Sample Every Days" switch to position 7, (for six day sampling use position 6).
- Turn "Sample for Hours" to desired number of running hours.
- Next put the Display switch, Switch #4, in the Start Time position.
- Then using the Set switch, Switch #3, enter the start time, hours and minutes.
- Next put the Display switch, Switch #4, in the Time of Day position.
- Then using the Set switch, Switch #3, enter the current time, hours and minutes.
- Now press and release the Reset switch, Switch #2, toward Timer. A small triangle on the display will start blinking. This indicates the timer is running.
- If you need to reset the Hour Meter to zero.
- Press and release the reset switch, Switch #2, twice, toward Hour Meter.
- Last thing to do is place the Sampler switch, Switch #1, (Timed – Off – On) in the Timed position.
- To turn off Power Failure Light turn Switch #4 to Start Time, if it is on Time of Day, or Time of Day if it is on Start Time. The light will reset next sampling period.



TOTAL VOLUME CALCULATIONS for Mass Flow Controlled PM10 Systems

TE-6070, TE-6070D

To calculate the total volume of air sampled through the (filter) during your sampling run, take a set-up reading (when you set the sampler up the SSP was 46.69, which is set up reading) and an ending reading, look at recorder chart and use the number where red ink pen stops, goes down, for our example lets assume the ending number was 45. Take 46.69 + 45 = 91.69 91.69/2 = 45.85. So the continuous recorder reading you would use is 45.85. Put that into formula on bottom of worksheet.

1/m((I)[Sqrt(Tav/Pav)]- b)

m = sampler slope
b = sampler intercept
I = average chart response
Tav = daily, weekly, monthly, or seasonal average temperature
Pav = daily, weekly, monthly, or seasonal average barometric pressure
Sqrt = square root

Example:

m^3/min = 1/17.6685((45.85)[Sqrt(291/757)]-(8.9094))
m^3/min = .0566 ((45.85)[Sqrt(.3844)] – 8.9094)
m^3/min = .0566 ((45.85)[.62] - 8.9094)
m^3/min = .0566 ((28.427) – 8.9094)
m^3/min = .0566 (19.5176)
m^3/min = 1.105
ft^3/min = 1.105 x 35.31 = 39.01
Total ft^3 = ft^3/min x 60 x hours that sampler ran

Assume our sampler ran 23.8 hours (end ETI reading - start ETI reading)

** Be certain ETI is in hours otherwise convert to hours **

Total ft^3 = 39.01 x 60 x 23.8 = 55,706.28 ft^3

Total m^3 = 1.105 x 60 x 23.8 = 1577.94 m^3

"Note" Reference page 66 see Appendix J for Filter Handling, Conditioning, Weighing, and Calculation of PM10 Concentration Measurements.

Appendix E.

SOP – Operation of TSP High Volume Air Sampler

- Sampler Operation
- Digital Timer Operation (refer to Appendix D)
- Total Volume Calculations (refer to Appendix D)

SAMPLER OPERATION TE-5170-D MFC TSP

1. After performing calibration procedure, remove filter holder frame by loosening the four wing nuts allowing the brass bolts and washers to swing down out of the way. Shift frame to one side and remove.

2. Carefully center a new filter, rougher side up, on the supporting screen. Properly align the filter on the screen so that when the frame is in position the gasket will form an airtight seal on the outer edges of the filter.

3. Secure the filter with the frame, brass bolts, and washers with sufficient pressure to avoid air leakage at the edges (make sure that the plastic washers are on top of the frame).

4. Wipe any dirt accumulation from around the filter holder with a clean cloth.

5. Close shelter lid carefully and secure with the "S" hook.

6. Make sure all cords are plugged into their appropriate receptacles and the rubber tubing between the blower motor pressure tap and the TE-5009 continuous flow recorder (or TE-5008 manometer) is connected (be careful not to pinch tubing when closing door).

7. Prepare TE-5009 continuous flow recorder as follows:

   a) Clean any excess ink and moisture on the inside of recorder by wiping with a clean cloth.

   b) Depress pen arm lifter to raise pen point and carefully insert a fresh chart.

   c) Carefully align the tab of the chart to the drive hub of the recorder and press gently with thumb to lower chart center onto hub. Make sure chart is placed under the chart guide clip and the time index clip so it will rotate freely without binding. Set time by rotating the drive hub clock-wise until the correct time on chart is aligned with time index pointer.

   d) Make sure the TE-160 pen point rests on the chart with sufficient pressure to make a visible trace.

8. Prepare the Timer as instructed on page 20.

9. At the end of the sampling period, remove the frame to expose the filter. Carefully remove the exposed filter from the supporting screen by holding it gently at the ends (not at the corners). Fold the filter lengthwise so that sample touches sample.

10. It is always a good idea to contact the lab you are dealing with to see how they may suggest you collect the filter and any other information that they may need.

Appendix F.

SOP – Calibration of PM_{10} and TSP High Volume Air Samplers

CALIBRATION PROCEDURE-Mass Flow Controlled TE-6070, TE-6070D

The following is a step-by-step process for the calibration of **TE-6070, TE-6070D Mass Flow Controlled PM10 High Volume Sampling Systems.** Following these steps are example calculations determining the calibration flow rates, and resulting slope and intercept for the sampler. These instructions pertain to the samplers that have flow controlled by electronic mass flow controllers (MFC) in conjunction with a continuous flow recorder. This calibration differs from that of a volumetric flow controlled sampler. The attached example calibration worksheets can be used with either a **TE-5025 Fixed Orifice Calibrator** that utilize resistance plates to simulate a variation in airflow or a **TE-5028 Variable Orifice Calibrator** which uses an adjustable or variable orifice. The attached worksheet uses a variable orifice. Either type of orifice is acceptable for calibrating high volume samplers the calibration process remains the same. Proceed with the following steps to begin the calibration:

Proceed with the following steps to begin the calibration:

Step one: Disconnect the sampler motor from the mass flow controller and connect the motor to a stable AC power source.

Step two: Mount the calibrator orifice and top loading adapter plate to the sampler. A sampling filter is generally not used during this procedure. Tighten the top loading adapter hold down nuts securely for this procedure to assure that no air leaks are present.

Step three: Allow the sampler motor to warm up to its normal operating temperature.

Step four: Conduct a leak test by covering the hole on top of the orifice and pressure tap on the orifice with your hands. Listen for a high-pitched squealing sound made by escaping air. If this sound is heard, a leak is present and the top loading adapter hold-down nuts need to be re-tightened.

"WARNING" Avoid running the sampler for longer than 30 seconds at a time with the orifice blocked. This will reduce the chance of the motor overheating.

"WARNING" never try this leak test procedure with a manometer connected to the side tap on the calibration orifice or the blower motor. Liquid from the manometer could be drawn into the system and cause motor damage.

Step five: Connect one side of a water manometer to the pressure tap on the side of the orifice with a rubber vacuum tube. Leave the opposite side of the manometer open to the atmosphere.

Note: Both valves on the manometer have to be open for the liquid to flow freely also to read a manometer one side of the 'U' tube goes up the other goes down; add together this is the "H_2O

Step six: Turn black knob on top of calibrator **(TE-5028A)** counter clock-wise opening the four holes on the bottom wide open. Record the manometer reading from the orifice and the continuous flow recorder reading from the sampler. A manometer must be held vertically to insure accurate readings. Tapping the backside of the continuous flow recorder will help to center the pen and give accurate readings. Repeat this procedure by adjusting the knob on the orifice to five different reading. Normally the orifice reading should be between 3.0" and 4.0" of H_2O. If you are using a fixed orifice **(TE-5025A)**, five flow rates are achieved in this step by changing 5 different plates (18,13,10,7, and 5 hole plates) and taking five different readings.

Step seven: Record the ambient air temperature, the ambient barometric pressure, the sampler serial number, the orifice s/n, the orifice slope and intercept with date last certified, today's date, site location and the operator's initials.

Step eight: Disconnect the sampler motor from its power source and remove the orifice and top loading adapter plate. Re-connect the sampler motor to the electronic mass flow controller.

An example of a PM10 Sampler Calibration Data Sheet has been attached with data filled in from a typical calibration. This includes the transfer standard orifice calibration relationship which was taken from the Orifice Calibration Worksheet that accompanies the calibrator orifice. Since this calibration is for a PM10 sampler, the slope and intercept for this orifice uses **actual** flows rather than standard flows and is taken from the Qactual section of the Orifice Calibration Worksheet. The Qstandard flows are used when calibrating a TSP sampler.

The five orifice manometer readings taken during the calibration have been recorded in the column on the data worksheet titled "H_2O. The five continuous flow recorder readings taken during the calibration have been recorded under the column titled I (chart).

The orifice manometer readings need to be converted to the actual airflows they represent using the following equation:

$$Qa = 1/m[Sqrt((H_20)(Ta/Pa))-b]$$

where: Qa = actual flow rate as indicated by the calibrator orifice, m^3/min
"H_20 = orifice manometer reading during calibration, (inches) "H_20

Ta = ambient temperature during calibration, K (K = 273 + °C)
Pa = ambient barometric pressure during calibration, mm Hg
m = *Qactual slope of orifice* calibration relationship
b = *Qactual intercept of orifice* calibration relationship.

Once these actual flow rates have been determined for each of the five run points, they are recorded in the column titled Qa, and are represented in cubic meters per minute.

The continuous flow recorder readings taken during the calibration need to be corrected to the current meteorological conditions using the following equation:

$$IC = I[Sqrt(Ta/Pa)]$$

where: IC = continuous flow recorder readings corrected to current Ta and Pa
I = continuous flow recorder readings during calibration
Pa = ambient barometric pressure during calibration, mm Hg.
Ta = ambient temperature during calibration, K (K = 273 + °C)

After each of the continuous flow recorder readings have been corrected, they are recorded in the column titled IC (corrected). Using Qa and IC as the x and y axis respectively, a slope, intercept, and correlation coefficient can be calculated using the least squares regression method. The correlation coefficient should never be less than 0.990 after a five point calibration. A coefficient below .990 indicates a calibration that is not linear and the calibration should be performed again. If this occurs, it is most likely the result of an air leak during the calibration.

The equations for determining the slope (m) and intercept (b) are as follows:

$$m = \frac{\sum xy - \frac{(\sum x)(\sum y)}{n}}{\sum x^2 - \frac{(\sum x)^2}{n}} \quad ; \quad b = \bar{y} - m\bar{x}$$

where: n = number of observations $\bar{y} = \sum y/n$; $\bar{x} = \sum x/n$ Σ = sum of

The equation for the coefficient of correlation (r) is as follows:

$$r = \frac{\sum xy - \frac{(\sum x)(\sum y)}{n}}{\sqrt{\left[\sum x^2 - \frac{(\sum x)^2}{n}\right]\left[\sum y^2 - \frac{(\sum y)^2}{n}\right]}}$$

where: n = number of observations
Σ = sum of

Example Problems

The following example problems use data from the attached calibration worksheet.

After all the sampling site information, calibrator information, and meteorological information have been recorded on the worksheet, standard air flows need to be determined from the orifice manometer readings taken during the calibration using the following equation:

1. **Qa = 1/m[Sqrt(($H_2$0)(Ta/Pa))-b]**

where:
- Qa = actual flow rate as indicated by the calibrator orifice, m^3/min
- "$H_2$0 = orifice manometer reading during calibration, (inches) "$H_2$0
- Ta = ambient temperature during calibration, K (K = 273 + °C)
- Pa = ambient barometric pressure during calibration, mm Hg
- m = *Qactual slope of orifice* calibration relationship
- b = *Qactual intercept of orifice* calibration relationship.

Note that the ambient temperature is needed in degrees Kelvin to satisfy the Qa equation. Also, the barometric pressure needs to be reported in millimeters of mercury. In our case the two following conversions may be needed:

2. **degrees Kelvin = [5/9 (degrees Fahrenheit - 32)] + 273**

3. **millimeters of mercury = 25.4(inches of H_2O/13.6)**

Inserting the numbers from the calibration worksheet run point number one we get:

4. Qa = 1/.99486 [Sqrt((5.45)(294/753)) - (-.00899)]

5. Qa = 1.005 [Sqrt((5.45)(.390)) + .00899]

6. Qa = 1.005 [Sqrt(2.1255) + .00899]

7. $Qa = 1.005[1.4579 + .00899]$

8. $Qa = 1.005[1.46689]$

9. $Qa = 1.474$

Throughout these example problems you may find that your answers vary some from those arrived at here. This is probably due to different calculators carrying numbers to different decimal points. The variations are usually slight and should not be a point of concern. Also, with a good calibration there should be at least three Qa numbers in the range of 1.02 to 1.24 m^3/min (36 to 44 CFM). From the data sheet there is 4 out of 5 numbers in the range for PM10 thus a good calibration.

With the Qa determined, the corrected chart reading (IC) for this run point needs to be calculated using the following equation:

10. **IC = I[Sqrt(Ta/Pa)]**

where:
IC = continuous flow recorder readings corrected to current Ta and Pa
I = continuous flow recorder readings during calibration
Pa = ambient barometric pressure during calibration, mm Hg.
Ta = ambient temperature during calibration, K (K = 273 + °C)

Inserting the data from run point one on the calibration worksheet we get:

11. IC = 56 [Sqrt(294/753)]

12. IC = 56 [Sqrt(.390)]

13. IC = 56 [.6244997]

14. IC = 34.97

This procedure should be completed for all five run points. EPA guidelines state that at least three of the five Qa flow rates during the calibration be within or nearly within the acceptable operating limits of 1.02 to 1.24 m^3/min (36 to 44 CFM). If this condition is not met, the instrument should be recalibrated.

Using Qa as our x-axis, and IC as our y-axis, a slope, intercept, and correlation coefficient can be determined using the least squares regression method.

The equations for determining the slope (m) and intercept (b) are as follows:

15. $$m = \frac{\sum xy - \frac{(\sum x)(\sum y)}{n}}{\sum x^2 - \frac{(\sum x)^2}{n}} \quad ; \quad b = \bar{y} - m\bar{x}$$

where: n = number of observations

$\bar{y} = \Sigma y/n$; $\bar{x} = \Sigma x/n$ Σ = sum of.

The equation for the coefficient of correlation (r) is as follows:

16. $$r = \frac{\Sigma xy - \frac{(\Sigma x)(\Sigma y)}{n}}{\sqrt{\left[\Sigma x^2 - \frac{(\Sigma x)^2}{n}\right]\left[\Sigma y^2 - \frac{(\Sigma y)^2}{n}\right]}}$$

where: n = number of observations

Σ = sum of.

Before these can be determined, some preliminary algebra is necessary. Σx, Σy, Σx^2, Σxy, $(\Sigma x)^2$,

$(\Sigma y)^2$, n, $\bar{y}$, and $\bar{x}$ need to be determined.

17. $\Sigma x = 1.475 + 1.167 + 1.115 + 1.079 + 1.060 = 5.896$
18. $\Sigma y = 35.00 + 29.37 + 28.75 + 28.12 + 27.50 = 148.74$
19. $\Sigma x^2 = (1.475)^2 + (1.167)^2 + (1.115)^2 + (1.079)^2 + (1.060)^2 = 7.069$
20. $\Sigma y^2 = (35.00)^2 + (29.37)^2 + (28.75)^2 + (28.12)^2 + (27.50)^2 = 4461.1438$
21. $\Sigma xy = (1.475)(35.00) + (1.167)(29.37) + (1.115)(28.75) + (1.079)(28.12) + (1.060)(27.50) = 177.448$
22. $n = 5$
23. $\bar{x} = \Sigma x/n = 1.1792$
24. $\bar{y} = \Sigma y/n = 29.748$
25. $(\Sigma x)^2 = (5.896)^2 = 34.763$
26. $(\Sigma y)^2 = (149.74)^2 = 22{,}123.587$

Inserting the numbers:

27. $$\text{slope} = \frac{177.448 - \frac{(5.896)(148.74)}{5}}{7.069 - \frac{34.763}{5}}$$

28. slope = $$\frac{177.448 - \frac{(876.971)}{5}}{7.069 - \frac{34.763}{5}}$$

29. slope = $$\frac{177.448 - 175.394}{7.069 - 6.953}$$

30. slope = $$\frac{2.054}{0.116}$$

31. slope = 17.707

32. intercept = 29.748 - (17.707)(1.1792)

33. intercept = 29.748 – 20.88

34. intercept = 8.868

35. correlation coeff. = $$\frac{177.448 - \frac{(5.896)(148.74)}{5}}{\sqrt{\left[7.069 - \frac{34.763}{5}\right]\left[4461.1438 - \frac{22123.587}{5}\right]}}$$

36. correlation coeff. = $$\frac{177.448 - \frac{(876.971)}{5}}{\sqrt{[(7.069 - 6.953)]\ [(4461.1438 - 4424.717)]}}$$

37. correlation coeff. = $$\frac{(177.448 - 175.394)}{\sqrt{[(7.069 - 6.953)][(4461.1438 - 4424.717)]}}$$

38. correlation coeff. = $$\frac{2.054}{\sqrt{(0.116)(36.427)}}$$

39. correlation coeff. = $$\frac{2.054}{\sqrt{4.226}}$$

40. correlation coeff. = $$\frac{2.054}{2.056}$$

41. correlation coeff. = .999

A calibration that has a correlation coefficient of less than .990 is not considered linear and should be re-calibrated. As you can see from the worksheet we have 4 Qa numbers that are in the PM10 range (1.02 - 1.24 m^3/min) and the correlation coeff. is > .990 , thus a good calibration. Next, calculate and record the SFR (sampler's seasonally adjusted set point flow rate in m^3/min).

SFR = 1.13 [(Ps/Pa)(Ta/Ts)]

where:	SFR	= sampler's seasonally adjusted set point flow rate, m^3/min
	1.13	= designed sampling flow rate of PM10 samplers, m^3/min
	Ps	= seasonal average barometric pressure, mm Hg
	Pa	= actual ambient barometric pressure during calibration, mm Hg
	Ts	= seasonal average temperature, K
	Ta	= actual ambient temperature during calibration, K

SFR = 1.13 [(757/753)(294/291)]

SFR = 1.13 [(1.005312)(1.0103092)]

SFR = 1.13 [1.0156759]

SFR = 1.147 m^3/min

To be more accurate when using an average temperature and barometric pressure, it is better to use a daily, weekly, or monthly average instead of a seasonal average.

Then, calculate and record the SSP, sampler's seasonally adjusted recorder set point.

SSP = [m * SFR + b] [Sqrt(Pa/Ta)]

where:	SSP	= sampler's recorder set point, recorder response
	m	= slope of sampler from linear regression
	SFR	= sampler's seasonally adjusted set point flow rate, m^3/min

b = intercept of sampler from linear regression

Sqrt = square root

Pa = actual ambient barometric pressure during calibration, mm Hg

Ta = actual ambient temperature during calibration, K

SSP = [17.6685 * 1.147 + 8.9094] [Sqrt(753/294)]

SSP = [29.175169] [Sqrt(2.5612244)]

SSP = [29.175169] [1.6003825]

SSP = 46.69

The SSP is the design operating flow rate of the PM10 High Volume Sampler, 1.13 m^3/min or 40 CFM, corrected to the current ambient temperature and barometric pressure. Adjust the mass flow controller to agree with the above determined SSP. This is done by loading the sampler with a piece of Micro-Quartz filter. Turn on the sampler and allow it to warm up to normal operating conditions. Adjust the mass flow controller set screw (turning pot) until the flow/pressure recorder reads 46.69. The sampler should now be sampling at the designed flow rate of 1.13 m^3/min or 40 CFM, corrected to current meteorological conditions.

Tisch Environmental, Inc.
PM10 High Volume Sampler Calibration

SITE

Location-> Cleves, Ohio   Date-> 1-2000
Sampler-> TE-6070BL, TE-6070D-BL   Tech-> Jim Tisch

CONDITIONS

Sampler Elevation (feet)	400		
Sea Level Pressure (in Hg)	30.05	Corrected Pressure (mm Hg)	753
Temperature (deg F)	70	Temperature (deg K)	294
Seasonal SL Press. (in Hg)	30.20	Corrected Seasonal (mm Hg)	757
Seasonal Temp. (deg F)	65	Seasonal Temp. (deg K)	291

CALIBRATION ORIFICE

Make-> Tisch Environmental, Inc   Slope-> 0.99486
Model-> TE-5025A   Intercept-> -0.00899
Serial#-> 3   Date Certified-> Original

CALIBRATION

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	5.45	1.475	56.0	35.00	Slope = 17.6685
2	3.40	1.167	47.0	29.37	Intercept = 6.9094
3	3.10	1.115	46.0	28.75	Corr. coeff.= 0.9988
4	2.90	1.079	45.0	28.12	SFR = 1.147
5	2.80	1.060	44.0	27.50	SSP = 46.67

CALCULATIONS

Qa = 1/m(Sqrt((H2O)(Ta/Pa))-b)
IC = I(Sqrt(Ta/Pa))

Qa = actual flow rate
IC = corrected chart response
m = calibrator slope
b = calibrator intercept
Ta = actual temperature (deg K)
Pa = actual pressure (mm Hg)

SFR = 1.13(Ps/Pa)(Ta/Ts)
SSP = (m*SFR+b)(Sqrt(Pa/Ta))

SFR = sampler set point flow rate
SSP = sampler chart set point
m = sampler slope
b = sampler intercept
Ta = actual temperature (deg K)
Pa = actual pressure (mm Hg)
Ts = seasonal temperature (deg K)
Ps = seasonal pressure (mm Hg)

For subsequent calculation of sampler flow:
1/m((I)(Sqrt(Tav/Pav))-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

Appendix G.

SOP – Maintenance of PM_{10} and TSP High Volume Air Samplers

- Routine Maintenance
- Motor Brush Replacement
- Troubleshooting / Corrective Maintenance

ROUTINE MAINTENANCE

TE-6000 Series, TE-6070, TE-6070D.

A regular maintenance schedule will allow a monitoring network to operate for longer periods of time without system failure. Many users find the adjustments in routine maintenance frequencies are necessary due to the operational demands on their sampler(s). We recommend that the following cleaning and maintenance activities be observed until a stable operating history of the sampler has been established.

1. Inspect all gaskets (including motor cushion) to assure they are in good shape and that they seal properly. For the PM-10 Inlet to seal properly, all gaskets must function properly and retain their resilience. Replace when necessary.

2. Power cords should be periodically inspected for good connections and for cracks (replace if necessary).

   CAUTION: Do not allow power cord or outlets to be immersed in water.

3. Inspect the filter screen and remove any foreign deposits.

4. Inspect the filter media holder frame gasket each sample period. This gasket must make an airtight seal.

5. For Brush type systems: Check or replace motor brushes every 300 to 500 hours. If motor has exhausted brush changes, then replace motor.

6. Insure the elapsed time indicator is operating by watching under power.

7. Be certain the continuous flow recorder pen is making contact with the chart and depositing ink each sample period. Be sure the door is sealed completely. Tubing should be inspected for crimps or cracks. Replace when necessary.

8. Clean shim plate periodically, excess dirt will cause false reading and bounce of heavier particulate. See Section SAMPLER OPERATION

9. Be certain the alignment pins are aligning properly. The upper and lower tubs must have an airtight seal.

Be careful not to bend any parts of inlet out of their original aerodynamic shape, mainly the hood, acceleration nozzle plate, nozzles and vent tubes.

MOTOR BRUSH REPLACEMENT TE-6070, TE-6070D MFC PM10

(110v Brush part #TE-33384)
(220v Brush part #TE-33378)

CAUTION: Unplug the system from any line voltage sources before any servicing of blower motor assembly.

1. Remove the blower motor flange by removing the four bolts. This will expose gasket and the TE-116311 motor (220v Motor TE-116312).
2. Rotate the assembly on it's side, loosen the cord retainer and then push cord into housing and at the same time let motor slide out exposing the brushes.
3. Looking down at motor, there are 2 brushes, one on each side. Carefully pry the brass tabs (the tabs are pushed into end of brush) away from the expended brushes and toward the armature. Pry the tabs until they dislodge from the brushes.
4. With a screwdriver loosen and remove brush holder clamps and release TE-33384 brushes. Carefully, pull the tabs from expended brushes.
5. Slide the tabs into tab slot of new TE-33384 brush.
6. Push brush carbon against armature until brush housing falls into brush slot on motor.
7. Put brush holder clamps back onto brushes.
8. Make sure the tabs are firmly seated into tab slot. Check field wires for good connections.
9. Insert the motor by placing housing over while pulling power cord out of housing. Be certain not to pinch the motor wires with the motor spacer ring.
10. Secure power cord with the cord retainer cap.
11. Replace blower motor flange on top of motor making sure to center gasket.

IMPORTANT To enhance motor life:

1. Change brushes before brush shunt touches armature.
2. Seat new brushes by applying 50% voltage for 10 to 15 minutes, the TE-5075 brush break in device allows for the 50% voltage.

Troubleshooting/Corrective Maintenance Procedures

The following is a list of possible problems and the corrective measures.

Shelter: There is nothing on the anodized aluminum shelter that can wear out. In the event a system is dropped or blown over, some shelter parts may become bent. Simply re-shape the bent components or replace them as necessary.

Blower Motor: If the blower motor does not function, perform the following test: 1. Unplug the motor from the flow control device or timer. 2. Plug the motor directly into line voltage. If motor does not operate when plugged directly into line voltage, replace with new motor. If motor operates when plugged directly into line voltage then: See "Electrical Hook-Up" schematic. If motor still does not work, see timer and flow controller instructions.

Dickson Continuous/Flow Pressure Recorder: Not inking properly: replace pen. If pen arm is bent or pen arm lifter is damaged, thereby not allowing pen point to contact chart, replace the pen arm or pen arm lifter as necessary. A tight door seal is necessary to prevent drying of pen, replace if necessary. If pen does not respond properly to pressure/flow signal one of two solutions are available: 1. No rotation of chart indicates a defective chart drive. Replace as necessary. 2. Out of adjustment flow indications may exist if one adjusts the "adjustment screw" beyond its range. This condition allows the bellows to make contact with the chart drive thereby making the bellow movement inaccurate. Factory re-adjustment is necessary.

Filter holder: Two gaskets make contact with the filter holder. The 8" x 10" gasket seals between the shelter base pan and the flange of the filter holder. If this seal is compromised, replace the 8"x 10" gasket. The lower section of the filter holder is sealed against the blower with a round neoprene rubber gasket. This gasket should be replaced if any leakage is evident.

Filter Media Holder: The filter media holder uses the 8" x 10" gasket to seal between it and the filter holder. Another 8" x 10" gasket is also used on the filter media holder to seal between the filter hold-down frame and the filter media itself. If leakage is evident, inspect the gasket for foreign objects and replace as necessary.

Timer: If the timer does not activate the system at the desired time, see "Electrical Hookup Schematic" and timer instructions.

Size Selective Inlet: Inlet does not fit onto shelter: it is critical to install in inlet in a vertical path onto the shelter. Many times it will take two people to gently lower the inlet onto the shelter. If the holes in the sides of the shelter do not exactly line up with holes in Inlet shelter pan, it may be necessary to gently file away a small amount of material to align the holes. Most often the inlet holes will align by simply moving the inlet relative to the shelter until alignment. If the inlet hood does not fit onto acceleration plate, be sure that the spacers are not tightened until all of the washers, screws and spacers are loosely assembled. If inlet does not open properly, be sure the strut is in correct position and strut slot is aligned with shoulder bolt. If the top tub and bottom tub do not seal together, be sure alignment pin in top tub goes into alignment pin "hole" in bottom tub. It is also necessary that the alignment pins on 1st stage plate are aligned with the alignment pin "holes" on bottom tub. Adjustment hooks are provided to assure a seal between the top and bottom tube. To adjust, loosen nut with 3/8" wrench, adjust hook length until a tight seals develops then tighten nut. Shim plate clips are provided to assure the shim plate rests tightly against the first stage plate. Six adjustment screws and catches are provided to insure the seal between the inlet top section and the shelter base pan. Adjust catches by loosening the nuts with 3/8 wrench, adjust catch length until it seals then tighten. Do this for all 6 catches. A shelter base pan gasket 16"x 16" is provided to seal between the shelter base pan and inlet base pan. If a leak develops, replace this gasket. All gaskets should be inspected for age or misuse. Replace as necessary.

Appendix H.

SOP – Maintenance of Meteorological Station

- RM Young 05305 Wind Monitor-AQ: inspect bearings annually.
- Model SP-LITE pyranometer: routine cleaning in the field, no special requirements.
- Model TE525WS 8-inch diameter rain gage: routine cleaning in the field, no special requirements.
- CS705 snowfall adapter for the TE525WS 8-inch diameter rain gage: routine cleaning in the field and periodic changing and disposal of antifreeze.
- Model HMP45C temperature and relative humidity probe: routine cleaning in the field.
- Electrical Equipment: keep free of moisture.
- Batteries: periodically check charge, change when necessary.

Appendix I.

Sampling and Analysis Plan

Sampling and Analysis Plan

Air Quality Monitoring Program
Yerington Mine, Yerington, Nevada

Sample Date	Event #	Analysis	Primary Samples AM-1	AM-2	AM-3	AM-4	AM-5	AM-6	Field QC Samples Dup. (10%)	FB (5%)	TB (5%)
1/4/05	1	PM-10	1	1	1	1	1	1	1	1	
		TSP			1	1	1	1		1	
1/10/05	2	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			1
1/16/05	3	PM-10	1	1	1	1	1	1	1	1	1
		TSP			1	1	1	1		1	
1/22/05	4	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			
1/28/05	5	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1		1	
2/3/05	6	PM-10	1	1	1	1	1	1	1	1	
		TSP			1	1	1	1			
2/9/05	7	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			
2/15/05	8	PM-10	1	1	1	1	1	1	1	1	
		TSP			1	1	1	1			
2/21/05	9	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			
2/27/05	10	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			
3/5/05	11	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			1
3/11/05	12	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			
3/17/05	13	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			
3/23/05	14	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			
3/29/05	15	PM-10	1	1	1	1	1	1	1	1	1
		TSP			1	1	1	1		1	
4/4/05	16	PM-10	1	1	1	1	1	1	1	2	
		TSP			1	1	1	1			
4/10/05	17	PM-10	1	1	1	1	1	1	1	1	
		TSP			1	1	1	1			
4/16/05	18	PM-10	1	1	1	1	1	1	1	1	1
		TSP			1	1	1	1			
4/22/05	19	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			
4/28/05	20	PM-10	1	1	1	1	1	1	1	1	1
		TSP			1	1	1	1			
5/4/05	21	PM-10	1	1	1	1	1	1	1	1	1
		TSP			1	1	1	1			1
5/10/05	22	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			
5/16/05	23	PM-10	1	1	1	1	1	1	1		1
		TSP			1	1	1	1			

Sampling and Analysis Plan

Air Quality Monitoring Program

Yerington Mine, Yerington, Nevada

Sample Date	Event #	Analysis	Primary Samples AM-1	AM-2	AM-3	AM-4	AM-5	AM-6	Field QC Samples Dup. (10%)	FB (5%)	TB (5%)
5/22/05	24	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			1
5/28/05	25	PM-10	1	1	1	1	1	1	1	2	
		TSP			1	1	1	1			
6/3/05	26	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			1
6/9/05	27	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			
6/15/05	28	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			
6/21/05	29	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			
6/27/05	30	PM-10	1	1	1	1	1	1	1	1	2
		TSP			1	1	1	1			1
7/3/05	31	PM-10	1	1	1	1	1	1	1	1	1
		TSP			1	1	1	1			
7/9/05	32	PM-10	1	1	1	1	1	1	1	1	
		TSP			1	1	1	1			
7/15/05	33	PM-10	1	1	1	1	1	1	1		1
		TSP			1	1	1	1			
7/21/05	34	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			
7/27/05	35	PM-10	1	1	1	1	1	1	1		2
		TSP			1	1	1	1			
8/2/05	36	PM-10	1	1	1	1	1	1	1		1
		TSP			1	1	1	1			1
8/8/05	37	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1		1	
8/14/05	38	PM-10	1	1	1	1	1	1	1		1
		TSP			1	1	1	1		1	
8/20/05	39	PM-10	1	1	1	1	1	1	1	1	
		TSP			1	1	1	1			
8/26/05	40	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1		1	
9/1/05	41	PM-10	1	1	1	1	1	1	1		1
		TSP			1	1	1	1			
9/7/05	42	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			
9/13/05	43	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1		1	
9/19/05	44	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			
9/25/05	45	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1		1	
10/1/05	46	PM-10	1	1	1	1	1	1	1	1	1
		TSP			1	1	1	1			

Sampling and Analysis Plan

Air Quality Monitoring Program

Yerington Mine, Yerington, Nevada

Sample Date	Event #	Analysis	Primary Samples AM-1	AM-2	AM-3	AM-4	AM-5	AM-6	Field QC Samples Dup. (10%)	FB (5%)	TB (5%)
10/7/05	47	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			
10/13/05	48	PM-10	1	1	1	1	1	1	1	1	
		TSP			1	1	1	1			
10/19/05	49	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			
10/25/05	50	PM-10	1	1	1	1	1	1	1		1
		TSP			1	1	1	1			
10/31/05	51	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			
11/6/05	52	PM-10	1	1	1	1	1	1	1		2
		TSP			1	1	1	1			
11/12/05	53	PM-10	1	1	1	1	1	1	1		1
		TSP			1	1	1	1		1	
11/18/05	54	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			
11/24/05	55	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			1
11/30/05	56	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			
12/6/05	57	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			
12/12/05	58	PM-10	1	1	1	1	1	1	1	1	
		TSP			1	1	1	1			
12/18/05	59	PM-10	1	1	1	1	1	1	1		1
		TSP			1	1	1	1			
12/24/05	60	PM-10	1	1	1	1	1	1	1		
		TSP			1	1	1	1			1
12/30/05	61	PM-10	1	1	1	1	1	1	1		1
		TSP			1	1	1	1		1	
		Totals =			**610**				**61**	**31**	**31**
		Subtotals	61	61	122	122	122	122			

Notes

Dup. = Duplicate sample

FB = Field blank

QC = Quality control

TB = Trip blank

TSP = Total suspended particulates

Appendix J.

Laboratory Certifications
Severn Trent Laboratories

ALLEN BIAGGI, *Administrator*

(775) 687-4670

Administration
Facsimile 687-5856

Water Pollution Control
Facsimile 687-4684

Mining Regulation and Reclamation
Facsimile 684-5259

STATE OF NEVADA
KENNY C. GUINN
Governor

R. MICHAEL TURNIPSEED, *Director*

Waste Management
Corrective Actions
Federal Facilities

Air Pollution Control
Air Quality Planning
Water Quality Planning

Facsimile 687-6396

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL PROTECTION

333 W. Nye Lane, Room 138
Carson City, Nevada 89706

Jodie Carnes
Severn Trent Labs WA1116
2800 George Washington W.
Richland, WA 99352
August 2, 2004

STATE OF NEVADA
CERTIFIED PARAMETER LIST-DRINKING WATER - WASTE WATER

Pursuant to regulations adopted by the State Board of Health and the Environmental Commission, the State of Nevada will accept data from this laboratory for the following contaminants under the Safe Drinking Water and Clean Water Acts.

Please be advised that it is the responsibility of the laboratory to make your clientele aware of changes. In particular it is important that the clients are aware of the loss of any previously certified parameters. If the laboratory subcontracts samples to other laboratories, it is the responsibility of the laboratory to ensure that the contracting laboratory is Nevada certified for all contracted parameters. The clients must be made aware of any subcontracted work.

Proficiency testing results should be submitted prior to **December 31, 2004.**

CERTIFICATE EXPIRATION DATE: July 31, 2005
This parameter list supercedes any previously issued parameter lists.

Radiochemicals	**Methods**	**Radiochemicals**	**Methods**
Cobalt-60	901.1	Gross Alpha	900
Zinc-65	901.1	Gross Beta	900
Cesium-134	901.1	Uranium (Nat)	D5174-91
Cesium-137	901.1	Uranium-234/238	D5174-91
Barium-133	901.1	Radium-226	903.1
Strontium-89	905	Radium-228	904
Stontium-90	905	Tritium	906

END OF REPORT*

Summary of changes: Change of expiration date.

Jack Ruckman
Laboratory Certification Officer

8/3/04
Date

Tom Porta P.E., Bureau Chief
Water Quality Planning
Nevada Division of Environmental Protection

8/3/04
Date

OREGON

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

STL Richland

WA100002

2800 George Washington Way
Richland, WA 99352

IS GRANTED APPROVAL BY ORELAP. UNDER THE 2001 NELAC STANDARDS, TO PERFORM ANALYSES ON ENVIRONMENTAL SAMPLES IN MATRICES AS LISTED BELOW:

Potable Water
Non-Potable Water

AND AS RECORDED IN THE LIST OF APPROVED ANALYTES, METHODS, ANALYTIC TECHNIQUES, AND FIELDS OF TESTING ISSUED CONCURRENTLY WITH THIS CERTIFICATE AND REVISED AS NECESSARY.

ACCREDITED STATUS DEPENDS ON SUCCESSFUL ONGOING PARTICIPATION IN THE PROGRAM AND CONTINUED COMPLIANCE WITH THE STANDARDS.

CUSTOMERS ARE URGED TO VERIFY THE LABORATORY'S CURRENT ACCREDITATION STATUS IN OREGON.

Irene E. Ronning

Irene E. Ronning, Ph.D.
ORELAP Administrator
1717 SW 10th
Portland, OR 97201

ISSUE DATE: 1/10/2004

EXPIRATION DATE: 1/9/2005

Certificate No: WA100002-001

Oregon

Environmental Laboratory Accreditation Program

Public Health Laboratory
1717 SW 10th Avenue
Portland, OR 97201
(503) 229-5505
FAX (503) 229-5682
TTY (503) 731-4031

Department of Agriculture, Laboratory Division
Department of Environmental Quality, Laboratory Division
Department of Human Services, Public Health Laboratory

ORELAPID: WA100002
EPACode: WA00001

ORELAP Fields of Accreditation

Certificate: WA100002-001

STL Richland

2800 George Washington Way
Richland, WA, 99352

Issue Date: 1/10/2004 ***Expiration Date:*** 1/9/2005

As of 1/10/2004 this list supercedes all previous lists for this certificate number.
Cusotmers: Please verify the current accreditation standing with ORELAP.

MATRIX: Potable Water

Code	Reference		Description
30020203	ASTM D5174-91		Uranium - Laser Phosphorimetry
	Analyte Code	***Analyte***	
	3035	Uranium	
10112400	EPA 900.0		Radioactivity, Gross Alpha and Gross Beta
	Analyte Code	***Analyte***	
	2830	Gross-alpha	
	2840	Gross-beta	
10112808	EPA 901.1		Cesium/Iodine/Gamma emitters - Gamma ray spectrometry
	Analyte Code	***Analyte***	
	2765	Barium 133	
	2800	Cesium-134	
	2805	Cesium-137	
	2815	Cobalt 60	
	170	Iodine 131	
	3070	Zinc 65	
10113209	EPA 903.0		Radium by Alpha Spectrometer
	Analyte Code	***Analyte***	
	2965	Radium-226	
10113403	EPA 903.1		Radium 226 - Radon emanation
	Analyte Code	***Analyte***	
	2965	Radium-226	
10113607	EPA 904.0		Radium 228 by Beta Spectrometry
	Analyte Code	***Analyte***	
	2970	Radium-228	
10113801	EPA 905.0		Strontium Isotopes by Beta Spectrometry
	Analyte Code	***Analyte***	
	2995	Strontium-89	
	3005	Strontium-90	
10114008	EPA 906.0		Tritium
	Analyte Code	***Analyte***	
	3030	Tritium	
133	SM 18/19th ED 7500-U C		Uranium - Radiochemical
	Analyte Code	***Analyte***	
	3035	Uranium	

ORELAP Fields of Accreditation

ORELAPID: WA100002
EPACode: WA00001

Certificate: WA100002-001

STL Richland

2800 George Washington Way
Richland, WA, 99352

Issue Date: 1/10/2004 ***Expiration Date:*** 1/9/2005

As of 1/10/2004 this list supercedes all previous lists for this certificate number.
Cusotmers: Please verify the current accreditation standing with ORELAP.

MATRIX: Non-Potable Water

Code	Reference		Description
10112400	EPA 900.0		Radioactivity, Gross Alpha and Gross Beta
	Analyte Code	***Analyte***	
	2830	Gross-alpha	
	2840	Gross-beta	
10113403	EPA 903.1		Radium 226 - Radon emanation
	Analyte Code	***Analyte***	
	2965	Radium-226	
10113607	EPA 904.0		Radium 228 by Beta Spectrometry
	Analyte Code	***Analyte***	
	2970	Radium-228	

Appendix K.

Validation Criteria for Air Monitoring Data

Validation Criteria for Air Monitoring Data

Air Quality Monitoring Program

Yerington Mine, Yerington, Nevada

Parameter	Method	PQL(1) (µg)	MDL (µg)	LCS Control Limits Recovery (%)	LCS Control Limits RPD(2) (%)
PM_{10}	EPA IO-2.1	100	N/A	N/A	N/A
Arsenic	SW846-6020	2.0	0.50	75-125	20
Barium	SW846-6020	1.0	0.50	75-125	20
Cadmium	SW846-6020	1.0	0.20	75-125	20
Chromium	SW846-6020	2.0	0.50	75-125	20
Lead	SW846-6020	1.0	0.20	75-125	20
Mercury	SW846-7471A	0.2	0.0001	75-125	20
Selenium	SW846-6020	2.0	0.15	75-125	20
Silver	SW846-6020	1.0	0.20	75-125	20

Parameter	Method	MDA (pCi)
Thorium (228, 230, 232)	HASL-300	1.008
Radium 226	EPA 903.1M	1.008
Radium 228(b)	EPA 904.0M	3.12
Gross Alpha	HASL-300	19.92
Gross Beta	HASL-300	0.6
Uranium (234, 235, 238)	HASL-300	1.008

Notes:

(1) = maximum acceptable PQL

(2) = RPD limit includes laboratory duplicates

LCS = laboratory control sample

MDA = minimum detectable activity are isotope dependent based on a 60 min counting time.

MDL = method detection limit

µg = microgram

N/A = not applicable

pCi = picoCuries

PQL = practical quantitation limit

RPD = relative percent difference

METHOD 6020 METALS ANALYSES QA/QC CRITERIA

QUALITY PARAMETER	METHOD/ FREQUENCY	CRITERIA	CORRECTIVE ACTION
Instrument Tune	Daily, prior to calibration and sample analysis	Mass resolution < 1.0 amu @ 10% peak height and mass calibration 0.1 amu.	Retune instrument. Repeat tune solution and analysis.
Initial Calibration	Laboratory mixed standard calibration	Correlation coefficient: 0.995	Evaluate system. Recalibrate.
Calibration Blank	After initial calibration and each continuing calibration	< PQL	Rerun. Clean system. Reanalyze affected samples.
Initial Calibration Verification (ICV)	After calibration	10% of expected response	Reanalyze ICV. Recalibrate.
Continuing Calibration Verification (CCV)	Every 10 samples and end of run sequence	10% of expected response	Reanalyze. Recalibrate. Reanalyze samples.
Method Blank	1 per analytical batch	<PQL (RL)	Reanalyze. Recalibrate as necessary.
Internal Standard	Each sample	30-130 %	Reanalyze and/or narrate.
Duplicate Control Sample (DCS)	1 per analytical batch	See included table for specific analytes	Check calculations. Assess impact on data. Narrate.
Holding Time		Days to analysis: 180	

STL Reference Data Summary

Structured Analysis Code: S-2A-MH-3W-07

Target Analyte List: SAC: Multiple Metals (Ex. Hg)-AIR

Matrix: AIR
Extraction: PM-10 Filter Metals Digestion
Method: Inductively Coupled Plasma Mass Spectrometry(6020)
QC Program: AMBIENT AIR TESTING
Location: STL Sacramento

Target List 20954		Detection Limits					Check List 20962							Spike List 20963						
Syn	Compound	RL	Units	MDL	Units	Run Date	T	A	Amt	Units	LCL	UCL	RPD	T	A	Amt	Units	LCL	UCL	RPD
88	Aluminum	50.0	ug	22	ug	19980609	C	Y	1000	ug	78	118	15	C	Y	1000	ug	78	118	15
128	Antimony	2.0	ug	0.16	ug	19980609	C	Y	50	ug	81	105	15	C	Y	50	ug	81	105	15
140	Arsenic	2.0	ug	0.41	ug	19980609	C	Y	200	ug	82	105	15	C	Y	200	ug	82	105	15
194	Barium	1.0	ug	0.43	ug	19980609	C	Y	200	ug	86	109	15	C	Y	200	ug	86	109	15
222	Beryllium	1.0	ug	0.11	ug	19980609	C	Y	200	ug	79	105	15	C	Y	200	ug	79	105	15
411	Cadmium	1.0	ug	0.10	ug	19980609	C	Y	200	ug	82	105	15	C	Y	200	ug	82	105	15
2952	Chromium	2.0	ug	0.35	ug	19980609	C	Y	200	ug	81	114	15	C	Y	200	ug	81	114	15
637	Cobalt	1.0	ug	0.10	ug	19980609	C	Y	200	ug	80	119	15	C	Y	200	ug	80	119	15
643	Copper	2.0	ug	0.15	ug	19980609	C	Y	200	ug	86	112	15	C	Y	200	ug	86	112	15
1605	Lead	1.0	ug	0.15	ug	19980609	C	Y	200	ug	84	114	15	C	Y	200	ug	84	114	15
1659	Manganese	1.0	ug	0.14	ug	19980609	C	Y	200	ug	82	119	15	C	Y	200	ug	82	119	15
1956	Nickel	2.0	ug	0.12	ug	19980609	C	Y	200	ug	85	113	15	C	Y	200	ug	85	113	15
2200	Phosphorus	50.0	ug	50.0	ug	19981222	C	Y	1000	ug	80	120	20	C	Y	1000	ug	80	120	20
2281	Selenium	2.0	ug	0.12	ug	19980609	C	Y	200	ug	80	105	15	C	Y	200	ug	80	105	15
2285	Silver	1.0	ug	0.10	ug	19980609	C	Y	50	ug	84	110	15	C	Y	50	ug	84	110	15
2477	Thallium	1.0	ug	0.10	ug	19980609	C	Y	50	ug	87	119	15	C	Y	50	ug	87	119	15
2607	Vanadium	10.0	ug	0.34	ug	19980609	C	Y	200	ug	77	116	15	C	Y	200	ug	77	116	15
2649	Zinc	5.0	ug	1.1	ug	19980609	C	Y	200	ug	84	105	15	C	Y	200	ug	84	105	15

METHOD 7471A (Mercury) QA/QC CRITERIA

QUALITY PARAMETER	METHOD/ FREQUENCY	CRITERIA	CORRECTIVE ACTION
Initial Calibration	Blank and five standards. Daily before analysis	Correlation Coefficient 0.995	Evaluate system. Recalibrate.
Calibration Blank	After initial calibration and each calibration	< PQL[1]	Rerun. Clean system. Reanalyze affected samples.
ICV	After calibration	80-120%	Reanalyze ICV. Recalibrate.
CCV	Every 10 samples and end of run sequence	80-120%	Reanalyze. Recalibrate. Reanalyze affected samples.
Method Blank	1 per analytical batch	< PQL[1]	Reanalyze. Recalibrate as necessary. Reanalyze.
Duplicate Control Sample (DCS)	1 per analytical batch	80-120% (aqueous)	Check calculations. Re-extract and reanalyze as necessary. Assess impact on data. Narrate.
Holding Time		Days to analysis: 28	

1 The term PQL refers to the laboratory's standard Reporting Limit.

STL Reference Data Summary

Structured Analysis Code: **S-2A-O9-3W-07**

Target Analyte List: All Analytes

Matrix: AIR
Extraction: PM-10 Filter Metals Digestion
Method: Mercury (7471A, Cold Vapor) - Solids
QC Program: AMBIENT AIR TESTING
Location: STL Sacramento

Analyte List		Detection Limits					Check List 20978							Spike List 20979						
Syn	Compound	RL	Units	MDL	Units	Run Date	T	A	Amt	Units	LCL	UCL	RPD	T	A	Amt	Units	LCL	UCL	RPD
1701	Mercury	0.2	ug	0.00006	ug	19980126	C	Y	3.0	ug	80	120	20	C	Y	3.0	ug	80	120	20

Appendix L.

Validation Criteria for Meteorological Data

Variable	Screening Criteria (flag data if the value meets one of the following)
Wind Speed	▪ Less than zero or greater than 25 meters per second (m/s) ▪ Does not vary by more than 0.1 m/s for 3 consecutive hours ▪ Does not vary by more than 0.5 m/s for 12 consecutive hours
Wind Direction	▪ Less than zero or greater than 360° ▪ Does not vary by more than 1 degree for more than 3 consecutive hours ▪ Does not vary by more than 10 degrees for 18 consecutive hours
Temperature	▪ Greater than the local record high ▪ Less than the local record low ▪ Greater than a 10 °C change from the previous hour ▪ Does not vary by more than 0.5 °C for 12 consecutive hours
Solar Radiation	▪ Greater than zero at night ▪ Greater than the maximum possible for the date and latitude
Barometric Pressure	▪ Greater than the local record high ▪ Less than the local record low
Humidity	▪ Less than 30% during precipitation events ▪ Varies by 30% of the local average for 24 consecutive hours